



Director's Rule 23-2014

Applicant: City of Seattle Department of Planning and Development	Page 1 of 3	Supersedes: 7-99
	Publication:	Effective:
Subject: Method of Specifying Thickness of Spray-Applied Fire-Resistant Material (SFRM) for Structural Steel	Code and Section Reference: SMC	
	Type of Rule: Code Interpretation	
	Ordinance Authority: SMC 3.06.040	
Index:	Approved	Date
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PURPOSE

This Rule is intended to improve the spray-applied fire-resistant material (SFRM) documents submitted to DPD, to clarify general contractor's and design professional's roles in producing complete documents, and to clarify the City's expectations for this important part of assuring building safety.

BACKGROUND:

The Seattle Building Code (SBC) refers to American Society for Testing and Materials (ASTM) E 605-93 standard for its methods in determining the thickness of SFRM. These calculations may be applied to each size of structural steel member in a building and will result in different thicknesses of SFRM for each member depending on the W/D ratio (W is the average weight of the member in pounds per linear foot; D is the heated inside perimeter of the member measured in inches). Using ASTM E 605-93, a large number of thicknesses can be specified for each building. The difficulties of reviewing, applying, and inspecting such a large number of thicknesses warrant a simplification of the method for specifying thickness.

RULE

1. SFRM may not be applied until DPD has approved the SFRM plans.

2. Structural members shall be assumed to be in a thermal unrestrained condition for the purposes of determining SFRM thickness.
3. The use of ICC-ES evaluation reports or other approved evidence of fire resistance is required.
4. Members carrying wind and earthquake forces in combination with gravity loads are included in the definition of primary structure. Bracing used to reduce the effective length of a column shall have the same fire-resistance rating as the column.
5. Structural frame members carrying only wind or earthquake forces are not required to have a fire- resistance rating.

PRIOR TO BUILDING PERMIT ISSUANCE

The following is required prior to issuance of a building permit that includes the structural steel framing for the building:

1. The registered design professional for the project is responsible for specifying the minimum hourly values of the steel fire protection in the project general notes on the building permit plans.
2. The structural engineer shall identify the members that are primary and secondary on the structural framing plans of the building permit application or on plans included with the SFRM plans.
 - a) Section 202 of the SBC defines primary structural frame and secondary members. In the current code the treatment of elements not framing into columns that support significant floor areas is addressed by Interpretation I202S.
 - b) Members carrying wind and earthquake forces in combination with gravity loads are also primary members, as are bracing members used to reduce the effective length of a column. See items 4 and 5 above.

PRIOR TO APPLICATION OF SFRM

Three sets of SFRM shop drawings with supporting data shall be given to and approved by DPD prior to SFRM application. A list of structural member sizes, W/D ratios, and their associated thicknesses is not acceptable.

DPD requires the following information on the shop drawings:

1. The general contractor is responsible for assuring and approving the quality and completeness of the SFRM shop drawing before giving them to the registered design professional and DPD.
2. The registered design professionals shall indicate their review of the submittal on each sheet of the SFRM shop drawings. They shall write that the fire protection ratings and primary/secondary structural members are in conformance with the intent of the design on the plan set's lead sheet.
3. SFRM shop drawings shall include copies of the structural plans and elevations prepared by the structural engineer of record as required. The drawings shall reflect the primary and secondary frame determination and identify all structural members.

4. The SFRM shop drawings shall include the following:
 - a) Building Code edition to which the SFRM schedule conforms;
 - b) Classification (sprayed fiber or cementitious mixtures) and density (regular, medium, or high) of SFRM material/materials to be used;
 - c) Number of the ICC-ES evaluation report or equivalent;
 - d) Details of any non-standard configuration or assembly required to clarify compliance or obtain approval;
 - e) Name, address and telephone number of the person responsible for the preparation of the SFRM shop drawings;
 - f) Thickness and, where appropriate, classification and density of SFRM applied to each member.
5. Reductions in SFRM thickness at the edge of steel beam web penetrations and resulting increased SFRM thickness adjacent to the penetration shall be noted on the shop drawings. This section applies only to those SFRM products having an approved assembly rating that describes methods for thickness reductions at flange tips.

The general SFRM thickness as outlined in an approved fire assembly may be reduced by one half at the edges of beam web penetrations required for mechanical ducts or similar purposes. When the decreased thickness is allowed at the penetration edges, the required adjacent surface SFRM thickness shall be increased similar to what is required when flange tip reductions are made as prescribed in approved fire resistance designs. This increased surface thickness shall extend 12 inches in all directions from the web penetration.
6. Thicknesses of decking SFRM may be specified in typical details or notes provided the range of concrete topping thicknesses, decking gages, assembly details, etc., in the building are included and indicated on the plans.
7. Notes such as "All beams covered with 3/4 inch unless otherwise indicated on this sheet" are acceptable.
8. The number of different thicknesses specified shall be reasonable with regard to application, inspection, and the size of the project. For example, 3 or 4 thicknesses each for beams and columns for every hourly rating might be indicated. If a greater number of thicknesses are desired, justification shall be submitted with the shop drawings for approval by DPD.
9. When high-density SFRM is specified for exposed locations in a parking garage less than 8 feet from the floor and in areas subject to vehicular traffic, the following minimum performance values shall be called out on the shop drawings in accordance with ICC Acceptance Criteria AC-23:
 - a) A minimum bond strength of 7,000 pounds per square foot (psf) when tested in accordance with ASTM E 736-00;
 - b) A minimum compressive strength of 50,000 psf when tested in accordance with ASTM E 761-92; and
 - c) A minimum density of 35 pounds per cubic foot (pcf) when tested in accordance with ASTM E 605-93.